Open Access

J. Sustain. Econ. Dev., 2025, 3(1):31–40
ISSN (Online): 3005 -2513; ISSN (Print):3005-2505
DOI: https://doi.org/10.22194/JSD/25.41
https://societyfia.org/journal/JSD2

Society for Innovative Agriculture

Understanding Poverty Distribution In Punjab, Pakistan: A Disaggregated Approach

Muhammad Ilyas*, Muhammad Khalid Bashir, Asghar Ali and Hasan Zulfiqar

Institute of Agricultural and Resource Economics, University of Agriculture, Faisalabad, Pakistan
*Corresponding author's e-mail: ilyaschoudhary71@gmail.com

Poverty is a chronic issue all around the world, especially in the developing countries of Africa and Asia. Pakistan is a developing country in South Asia, and Punjab is the largest province of Pakistan, where more than 50 % of the total population resides. This study aims to analyze the factors contributing to poverty in this region, including economic instability, lack of access to education, and limited job opportunities. By understanding these underlying issues, the research seeks to identify effective strategies for alleviating poverty and improving the quality of life for the people of Punjab. The Punjab Bureau of Statistics conducted the Multiple Indicator Cluster Survey (MICS) in 2017–18. It contains comprehensive data on 53,840 households in 2,692 sample clusters. The modified Alkire and Foster multidimensional poverty index (MPI) is used to assess poverty in different divisions and is broken down further by district, including a comparison between rural and urban areas. The data on main dimensions of poverty, like education, healthcare, living standards, and happiness (a new dimension) of households is available in it All dimensions are assigned equal weights. Most of the indicators are same as in Global and Pakistan multidimensional poverty index. Around 21.04% of households in Punjab are found to be poor. The division-level data indicate that the southern divisions of Bahawalpur and Dera Ghazi Khan are the most impoverished, with poverty rates of 26.54% and 22.96%, respectively, while Gujranwala has the lowest poverty rate at 18.16%. District-level analysis reveals that multidimensional poverty is more widespread in rural regions than in urban areas. Urban Faisalabad is comparatively impoverished relative to its rural counterparts. It exhibits significant migration from rural regions as people pursue better opportunities, resulting in a majority living in urban slums characterized by overcrowding and inadequate health and educational services, particularly lack of clean drinking water. The results are further elaborated with the construction of poverty maps with the use of python software. The dark red colour represents the extreme poor areas such as Rahim Yar Khan in south Punjab and Attock in north Punjab. Moderate poverty is shown by orange colour as Khaniwal in Multan division. Least poor areas are represented by pale yellow like districts of Norowal, Gujrat and Gujranwala as shown in the poverty maps. The findings provide directives for government officials and NGOs to concentrate poverty reduction initiatives on localized regions instead of the whole province. This approach is crucial for enhancing targeting and reducing leakages.
Keywords: Alkire and Foster, Assessing, Mapping, Geographic, Lessening, Targeting, Impoverishment.

INTRODUCTION

Punjab, Pakistan's most populous and economically vital province, assists as the country's agricultural and industrial hub. It has major cities like Lahore, Rawalpindi, and Faisalabad, alongside rural areas. Key industries include textiles, pharmaceuticals, and cement, with Lahore as a major business and trade hub. Despite economic growth, Punjab faces socioeconomic disparities. Formal economic institutions along with improved healthcare and educational facilities are available in cities, yet rural areas have partial access to such facilities (Nadeem et al., 2022). The problems in cities are of costly housing, public facilities and overcrowding on the other hand rural areas suffer from less economic, educational and health opportunities. These areas also suffer from weak infrastructure and poor connectivity. All such issues can be addressed through a comprehensive targeted set of local requirements based policies to promote education, health, employment and infrastructure facilities. All such steps can be helpful in reducing poverty However, a deep insight of regional/ local inequalities is necessary for effective planning (Shergill & Metha, 2023). Many wealthy

Ilyas, M., Bashir, M.K. Ali A. & Zulfiqar H. (2025). Understanding Poverty Distribution in Punjab, Pakistan: A Disaggregated Approach. *Journal of Sustainable and Economic Development, 3(1),* 31–40 . https://doi.org/10.22194/JSD/25.41
[Received 17 Jan 2025; Accepted 15 Apr 2025; Published 19 Jul 2025]
Attribution 4.0 International (CC BY 4.0)

individuals were unhappy as compared to many poor but happy individuals (Graham, 2011).

Poverty is a multidimensional, so relying only a single indicator of consumption or income is not sufficient to overcome the problem (Kangas & Ritakallio, 2019). In the province, poverty extends from income or consumption, it is influencing education, health, sanitation, housing and transportation also. The Multidimensional Poverty Index (MPI) presents a wide-ranging framework to address these indicators with offering a clearer picture of poverty for addressing its primary causes. It also provides a permanent, effective and sustainable strategy for poverty reduction (Singh & Chudasama, 2020; Vilar-Compte et al., 2021).

The research of small geographical regions is helpful to identify the most justified spots and to evolve targeted policies. This is helpful for both governments and non-governments organizations to use resources efficiently for sustainable development and poverty reduction at province level (Eriksen et al., 2021). Targeted poverty reduction struggles can be made more efficient by focusing on the neediest areas on priority basis. It would be further helpful in narrowing down the economic and social gaps in Punjab (Qiu et al., 2022).

There exist remarkable differences in poverty across the districts and towns as poverty is not equally spread throughout the province or country. Spatial disaggregation addresses these differences efficiently and guide policy makers to treat each area according to its specific requirements for better implementation (Cartone et al., 2022). Special disaggregation enabled to focus the areas where special focus is required and to examine the results of targeted actions (Arambepola et al., 2022). Disaggregation indicated the high poverty areas where more responsiveness is required. It makes the scarce resource allocation efficient and more impactful in prioritizing the funds and as a results reduction in poverty (Baffoe, 2019). The econometric analysis of poverty suggested a methodology for poverty mapping at small geographical level (Bigman & Sirinivasan, 2002).

Geographical disaggregation provided a detailed insight into the distribution of poverty and helpful in promoting sustainable development and realizing long term development goals (Qiu et al., 2019). The MPI highlights the areas where Government involvement is required one step further from just income grants to promote health and educational facilities as well (Alkire et al., 2022). Targeted policies consider the economy, demography and infrastructure as well. This enhances the rate of success of efforts for sustainable reduction in poverty (Hossain, 2020). Geographic Information Systems (GIS) was used in the mapping of poverty in Rwanda to calculate welfare or other indicators for administrative entities like municipalities and districts (Akinyemi, 2010). The GIS Poverty Mapping was developed by using the indicators like family size, dependency ratio, population density, literacy, formal education, employment status, employment and industrial choice, credit access, region (urban / rural), property ownership, housing quality, and further access to facilities of drinking water, electricity, gas and sanitation (Arshad, 2005). Poverty hotspots areas with noticeably greater rates of poverty than surrounding areas that could be found by spatial mapping. It is helpful in making sure that steps to reduce poverty are well-organized and effective in focusing these targeted areas (Maharjan et al., 2020). The knowledge obtained from spatial mapping of poverty is invaluable. In-depth maps of poverty can help direct the distribution of funds, the design of social services, and the delivery of aid to the most disadvantaged communities (Kiran & Jabbar, 2022).

The Minimum Livelihood Guarantee (MLG or Dibao), which was established in China in 1999, aimed to give the urban poor a final resort. By the end of 2012, there were 21.4 million urban Dibao recipients and 67.4 billion Yuan had been spent overall on Dibao. When comparing non-participating families to participating families using the suitability score matching approach, the study indicated that Dibao had a significant impact on poverty reduction (Gao et al., 2015). To significantly lower the prevalence of poverty, these institutions-in particular, the BISP, PBM, and Zakat-must be combined and synergized (Shirazi & Obaidullah 2014). By increasing social security, enhanced access to basic services, and assistance with economic issues, the UN's SDG Agenda-1 seeks to eliminate life-threatening poverty by 2030. Pakistan aims to lessen Cost of Basic Needs (CBN) poverty from 24.3% in 2016 to 19% and multidimensional poverty from 38.8% in 2015 to 30% by 2023 during the 12th Five-Year Plan (Pakistan Economic Survey, 2018-19).

The study focuses on how a multidimensional poverty index is more effective than simple income or expenditure methods in understanding the scope of poverty, how changes in educational attainment, health, and household characteristics affect poverty levels in a given area, and what role Geographical Information System-based mapping plays in visualizing such differences. In short, poverty is multifaceted, multidimensional and not equally distributed in different regions of Punjab. Multidimensional poverty index is a good tool according to nation's requirements to identify the poverty hotspots at disaggregated level. Poverty maps are further helpful in making policies and allocating scarce resourcing in high priority areas for long term reduction of poverty.

MATERIALS AND METHODS

Development efforts are focused on where the most needed located and depend on having access to geographically disaggregated poverty statistics. Consumption, income, and assets data have historically been used to quantify poverty.

***Data Sources*:** The study obtains data from Multiple Indicators Cluster Survey (MICS) Punjab, 2017-18 (Bureau of Statistics, 2018). It provides very useful information in this

regard and is anticipated to support with evidence. Because the survey provides data on 32 global SDG indicators, the MICS Punjab, 2017–18 results are vital for SDG monitoring. The MICS Punjab, 2017–18 sample was created to offer estimates for a wide range of indicators about the status of women and children in Punjab, for both urban and rural regions, and for 36 districts. A systematic sample of 20 families was generated in each sample enumeration area using the Pakistan Bureau of Statistics' listing of households from the Census 2017 for each sample enumeration region. There were 53,840 households in 2,692 sample clusters overall.

***The Estimation Procedure*:** Poverty is not a unidimensional that can be measured with only consumption or income. It is multidimensional and depend upon a set of Dimensions of poverty such as education, health care, household characteristics, assets, etc. The Alkire & Foster (2011) developed a unique technique to measure poverty including multiple indicators of education, health and living standard. It provides not only a more comprehensive picture of but it also explains that who is poor and in what dimensions. Their framework is known as Alkire-Foster (AF) method. It is widely used around the world (Alkire & Jahan, 2018; UNDP & OPHI, 2023).

Global Multidimensional Poverty Index: It is a common and popular technique developed by Alkire and Foster to measure poverty and used by UNDP & OPHI (2023). It is consisted of three main dimensions with equal weights as shown in the equation.

$MPI = 1/3(Education + Health + Standard\ of\ living)$

The main dimensions are further subdivided into 10 indicators.

***Pakistan's Multidimensional Poverty Index*:** Planning Commission of Pakistan & UNDP (2016) derived this index from Global Multidimensional Poverty Index (MPI). Building on the worldwide MPI, Pakistan's MPI keeps the three main dimensions with equal weights (living standards, health, and education). However, the selection of indicators takes into account the specific political interests and environment of the nation, in addition to the information gleaned from the PSLM polls. This national index uses fifteen indicators in total, seven of which are also used in the global MPI

***Modified Multidimensional Poverty Index*:** This index is developed by main focusing on index developed by Alkire and Foster. Some modifications are taken from Pakistan's multidimensional poverty index and a few due to the change in the definitions of MICS data. Now one major modification is of adding a new dimension "Happiness" and assigning the same ¼ weights to each dimension. There was no clear relationship between average happiness levels and average

Table 1. Modified Dimensions of Poverty, Indicators, Cut-off points and Weights.

Dimensions of Poverty	Indicator	Deprived if living in the household where…	Weight
Education	Years of schooling	If did not ever attended school or early childhood program age 5 -17	1/12
	School attendance	If did not attended school or early childhood program during current school year age 5-17	1/12
	Quality of education	If any child who is not attending school due to quality concerns such as not availability of teachers due to strikes, etc.	1/12
Health	Child mortality under Five	If ever had a child who later died.	1/16
	Assistance at delivery	Any woman who has given birth under the care of non-qualified individuals (family member, friend, traditional birth attendant, etc.).	1/16
	Pre-natal care	If a woman has not got pre-natal care	1/16
	Immunization	If according to the vaccination schedule, any child under the age of five is not fully immunized.	1/16
Standard of living	Material of Exterior walls	If main material of exterior walls is mud , bamboo, etc.	1/28
	Assets	If a household has less than five items (radio, TV, iron, fan, sewing machine, refrigerator, washing machine, dryer, air cooler, etc.) are the only possessions in the home.	1/28
	Electricity	If the household has no electricity	1/28
	Overcrowding	If 4 or more persons are living per room.	1/28
	Cooking fuel	If the household uses solid cooking fuels for cooking (wood, dung cakes, crop residue, coal/charcoal, others)	1/28
	Water	If a household has not access to an improved source of water, given the distance (more than 30 minutes a round trip).	1/28
	Sanitation	If a household has not improved sanitation, septic tank, and sewer flush system, etc.	1/28
Happiness	Life satisfaction 1	If Unhappy in overall estimation of happiness	1/16
	Life Satisfaction 2	If not satisfied with less than five ladder steps	1/16
	Life satisfaction 3	If not Life satisfaction in comparison with last year	1/16
	Life satisfaction 4	If not Life satisfaction expectation one year from now	1/16

Multiple Cluster Indicator Survey 2017-18

income levels. Happiness rose with higher income levels but only up to a specific point (Graham, 2005). There was found a negative relation between and the multidimensional poverty index and the happiness scores for extreme poor households (Mateu et al, 2020).

Thus, the modified equation now takes the form:

$$MPI = 1/4(Education + Health + Standard\ of\ living + Happiness)$$

The main dimensions, indicators, cut-off points and weights are given in Table 1.

The data for indicator overcrowding is not directly present in MICS. So it is obtained through a simple calculation of two indicators present in the data set; the number of household members and number of rooms available for sleeping. Thus Overcrowding = Number of HH members/ Number of rooms for sleeping.

***Descriptive Statics*:** Descriptive statistics of poverty indicators is shown in the following table. It shows the minimum, maximum and mean value of every indicator.

Table 2. Descriptive Statistics of Poverty Indicators.

Dimensions of Poverty	Indicator	Min.	Max.	Mean
Education	Years of schooling	0	1	0.90
	School attendance	0	1	0.86
	Quality of education	0	1	0.93
Health	No Child mortality under Five	0	1	0.81
	Assistance at delivery by qualified person (Doctor)	0	1	0.09
	Pre-natal care	0	1	0.89
	Immunization	0	1	0.81
Standard of living	Material of Exterior walls (Cement, Stone, Bricks, etc.)	0	1	0.86
	Assets	0	1	0.61
	Electricity	0	1	0.96
	Overcrowding	0	1	0.31
	Cooking fuel	0	1	0.60
	Water	0	1	0.79
	Sanitation	0	1	0.82
Happiness	Life satisfaction 1	0	1	0.81
	Life Satisfaction 2	0	1	0.86
	Life satisfaction 3	0	1	0.94
	Life satisfaction 4	0	1	0.91

Multiple Cluster Indicator Survey 2017-18

RESULTS

The modified global Multidimensional Poverty Index (MPI) has four main dimensions and 18 sub indictors. By applying a unique approach of introducing the 4 new sub variables under the one new dimension of happiness the poverty in Punjab is found 21.04% in 2018. These estimates are supported by the global Multidimensional Poverty Index (MPI), the value of that index is 0.24 (24%) by using data from the Pakistan Bureau of Statistics 2018–19 Pakistan Social and Living Standards Measurement (PSLM) which indicates that 24% of Pakistan's population suffers from multidimensional poverty (Haq et al., 2024). Pakistan's poverty rate, based on its national poverty line in 2018 was 21.9% (World Bank, 2023). Pakistan's poverty rate has steadily decreased over the past few decades, both nationally and regionally and in both urban and rural areas. Because of well-designed measures to reduce poverty such as Benazir Income Support Program (BISP), Pakistan Poverty Alleviation Fund (PPAF) and Pakistan Bait-ul-Mal, the percentage of individuals living below the poverty line has decreased gradually from 50.4 percent in 2005–06 to 24.3 percent in 2015–16. (Pakistan Economic Survey, 2018-19).

The largest administrative unit in province is division level. It has been further divided into districts and these administrative units are further subdivided into rural and urban areas. The poverty estimates at division level, further divided into rural and urban areas.

***Division Level Poverty Estimates*:** Punjab is sub-divided into Southern Punjab and Central Punjab. Southern Punjab consists of three divisions namely Bahawalpur, Dera Ghazi Khan and Multan, whereas Central Punjab consists of six divisions namely Faisalabad, Gujranwala, Lahore, Rawalpindi, Sahiwal and Sargodha. Each division is further subdivided into rural area and urban area (e.g.) Bahawalpur rural and Bahawalpur urban. The estimates of division wise poverty are presented in Table 3.

***Explanation*:** Table 3 presents the poverty rates in Punjab, Pakistan, for the various divisions. Punjab's poverty levels vary significantly across its divisions, with Bahawalpur (26.54%) and Dera Ghazi Khan (22.96%) ranking highest in poverty. Bahawalpur struggles with low school enrollment (20%), poor immunization rates (33%), and overcrowding (6% above Punjab's average). Dera Ghazi Khan faces similar issues, with high child mortality, limited healthcare, and a low standard of living. Lahore, despite being an urban hub, has a poverty rate of 21.01%, while Faisalabad (19.64%) and Gujranwala (18.16%) have lower poverty rates due to industrialization. Gujranwala, with the lowest poverty rate, benefits from economic diversification. Rural poverty (21.19%) is slightly higher than urban poverty (20.70%) in Punjab, with southern divisions facing greater economic challenges due to their reliance on agriculture. Urban poverty, while lower, is still an issue in cities like Faisalabad due to rapid urbanization, overcrowding, and underemployment.

The results depict that dependence on agriculture and lack of job opportunities due to weak industrial base in divisions of Bahawalpur and Dera Ghazi Khan are extreme poor respectively. On the other hand, Gujranwala and Faisalabad are found least poor due to large number of different industries with more job opportunities and relatively higher incomes.

***Explanation*:** Districts wise and rural/ urban results present a more detailed picture of the extent of poverty across Punjab. The ranking shows that the poorest district of Punjab is

Table 3. Division and area wise poverty estimates in Punjab.

Sr.	Name of Division	Rural Poverty in %	Rank	Urban Poverty in %	Rank	Overall Poverty in %	Ranks in Punjab
1	Bahawalpur	26.86	1	25.35	1	26.54	1
2	Dera Ghazi Khan	23.09	2	22.37	2	22.96	2
3	Faisalabad	19.06	8	20.77	4	19.54	8
4	Gujranwala	18.18	9	18.09	9	18.16	9
5	Lahore	21.43	5	20.74	6	21.01	5
6	Multan	21.05	6	20.41	8	20.87	6
7	Rawalpindi	21.91	3	20.84	3	21,39	3
8	Sahiwal	21.05	7	20.42	7	20.79	7
9	Sargodha	21.53	4	20.74	5	21.36	4
All Punjab	------	21.19	----	20.70	----	21.04	-----

Multiple Indicator Cluster Survey (2017-18)

Bahawalnagar with 27.3% of population living in poverty. The same is the position of this district as it is the poorest district in urban poverty rankings. Dera Ghazi Khan ranks 2nd, Rahim Yar Khan 3rd, Layyah 4th and Bahawalpur 5th respectively showing low assets, lack of clean drinking water, poor sanitation and health facilities. The above districts are extreme poor and require special attention. Chakwal, Hafizabad, Khanewal and Rawalpindi fall in the middle of ranking showing moderate poverty, whereas, the least poor or near poor district of Punjab is Gujrat showing good performance in assets, availing better sanitation, education and health facilities. The 2nd least poor district is Gujranwala with a slightly higher rate of poverty. Most of the districts rural areas are relatively higher poverty percentage as compared with their urban counter parts, however rural poverty rates are low in Faisalabad as compared with urban poverty showing overcrowding due to migrated population from surroundings, remote areas and other small cities is making it the 2nd largest city of the province. The pressure of population with limited job opportunities to unskilled and low skilled labour due to industrial slowdown is enhancing poverty. It is compelling the low incomes to reside in low cost residential areas with the least facilities specially the problem of clean drinking water is severe.

A general pattern observed in the data is that rural areas have higher poverty rates than urban areas due to limited employment opportunities, lower literacy rates, and lack of infrastructure. However, some districts, such as Bahawalnagar, D.G. Khan, and Mandi Bahauddin, show higher urban poverty rates, suggesting that urban poverty is still a significant issue in certain regions. In Central Punjab, districts like Faisalabad (19.84%) and Sahiwal (22.40%) have moderate overall poverty levels, but Faisalabad, despite being an industrial hub, has relatively high urban poverty (22.12%), indicating possible income inequality or a high proportion of informal labor.

Another significant district in the dataset is Lahore, the provincial capital, which lacks rural poverty data but has an urban poverty rate of 20.24%. Despite being Punjab's economic hub, Lahore still faces moderate poverty levels, likely due to rapid urbanization, migration from poorer regions, and economic disparity within the city. Other mid-range poverty districts include Nankana Sahib (22.71%), Attock (23.25%), and Sheikhupura (22.27%), where urban and rural poverty levels are fairly balanced. The trend indicates that industrial centers tend to have lower poverty compared to agriculture-dependent districts.

The regional analysis further emphasizes that Southern Punjab remains the most impoverished region, needing targeted policies for industrial growth, improved educational facilities, and better healthcare access. Central Punjab has mixed results, with some urbanized districts doing well, while others still experience economic challenges.

***Poverty mapping*:** The conditions and circumstances of people across the country cannot be concluded to only national averages. Economic development within a nation can be uneven, with some areas seeing progress while others lag. To monitor welfare and choose where to concentrate development efforts where they are most needed, it is crucial to comprehend these disparities at a relatively smaller level. The same are the circumstances at province level. So in order to focus areas on priority basis a very useful technique is poverty mapping. Poverty mapping is a useful technique that provides an extensive description of spatial distribution of inequality and poverty. Poverty maps are based on some indicators such as health, education, sanitation and household characteristics. Such indicators are useful to capture multidimensional poverty. Poverty Maps in this study are drawn with the help of python software.

***Division wise rural poverty in Punjab*:** The map depicts rural poverty in different divisions in Punjab. The comparison is shown by the map in Fig.1.

***Explanation*:** Dera Ghazi Khan and Bahawalpur divisions are highlighted in red, signifying the highest concentrations of rural poverty. Rawalpindi and Sargodha Orange-colored, signifying a moderate degree of poverty. Gujranwala, Multan,

Table 4. Districts and area wise poverty estimates and ranks.

Sr.	Name of District	Rural Poverty in %	Ranks	Urban Poverty in %	Ranks	Over all Poverty in %	Ranks
1	Bahawalpur	26.33	4	22.83	8	25.45	5
2	Bahawalnagar	27.06	2	28.66	1	27.33	1
3	Rahim Yar Khan	27.10	1	25.35	5	26.73	3
4	Dera Ghazi Khan	26.60	3	28.38	2	26.87	2
5	Layyah	26.00	5	25.99	3	26.00	4
6	Muzaffargarh	18.70	30	15.70	36	18.23	32
7	Rajanpur	22.61	7	21.55	14	22.42	8
8	Faisalabad	17.64	32	22.12	10	19.84	29
9	Chiniot	17.67	31	17.27	33	17.49	33
10	Jhang	20.25	26	18.35	29	19.87	28
11	Toba Tek Sing	20.74	22	18.35	30	20.31	26
12	Gujranwala	16.22	35	17.65	32	16.93	35
13	Gujrat	16.69	34	15.77	35	16.68	36
14	Hafizabad	21.72	13	19.40	28	21.17	17
15	Mandi Bahauddin	19.30	28	22.11	11	19.84	30
16	Narowal	17.13	33	16.34	34	17.05	34
17	Sialkot	18.95	29	17.83	31	18.70	31
18	Lahore	------	36	20.24	23	20.24	27
19	Kasur	19.62	27	22.71	9	20.34	25
20	Nankana Sahib	22.28	11	25.55	4	22.71	7
21	Sheikhpura	22.44	10	21.81	13	22.27	10
22	Multan	20.84	20	20.32	22	20.62	22
23	Khanewal	21.17	17	20.38	21	21.00	18
24	Lodran	21.70	15	21.11	17	21.60	13
25	Vehari	20.75	21	20.46	20	20.70	21
26	Rawalpindi	21.04	19	20.97	18	20.99	19
27	Attock	23.22	6	22.99	7	23.25	6
28	Chakwal	20.69	24	23.17	6	21.25	16
29	Jehlum	20.15	25	19.81	27	20.39	24
30	Sahiwal	22.52	9	21.85	12	22.40	9
31	Okara	20.70	23	20.08	25	20.56	23
32	Pakpattan	22.54	8	20.69	19	22.23	11
33	Sargodha	21.82	12	21.18	16	21.66	12
34	Bhakkar	21.72	14	19.93	26	21.51	14
35	Khoshab	21.55	16	21.38	15	21.51	15
36	Mianwali	21.08	18	20.12	24	20.86	20

Multiple Indicator Cluster Survey (2017-18)

Sahiwal, and Faisalabad Compared to other divisions, this one has the lowest rates of rural poverty and is represented by pale yellow. Lahore is shown in yellow; the city has a moderate prevalence of rural poverty. The map displays a substantial disparity in rural poverty between the center and northern divisions (Faisalabad, Sahiwal, and Gujranwala) and the southern divisions (Dera Ghazi Khan, Bahawalpur).

It is evident that rural poverty is more prevalent in the southern regions. This could be because to past underdevelopment, a lack of infrastructure, and restricted access to resources. However, areas like Gujranwala and Faisalabad have been able to maintain relatively low rates of rural poverty, perhaps as a result of their improved accessibility to government programs, markets, and infrastructure.

***Division wise urban poverty in Punjab*:** Urban poverty disparity varies among divisions. These differences are shown by Fig.2.

***Explanation*:** The map represents divisions of Dera Ghazi Khan and Bahawalpur with red colour showing extreme poverty. This is the results of low level of education, health and housing facilities along with inadequate infrastructure, less industrialization. Rawalpindi and Faisalabad divisions are shown by orange colour depicting high urbanization, overcrowding and lack of opportunities. Poverty is concentrated in many unplanned urban establishments and in surroundings of urban areas.

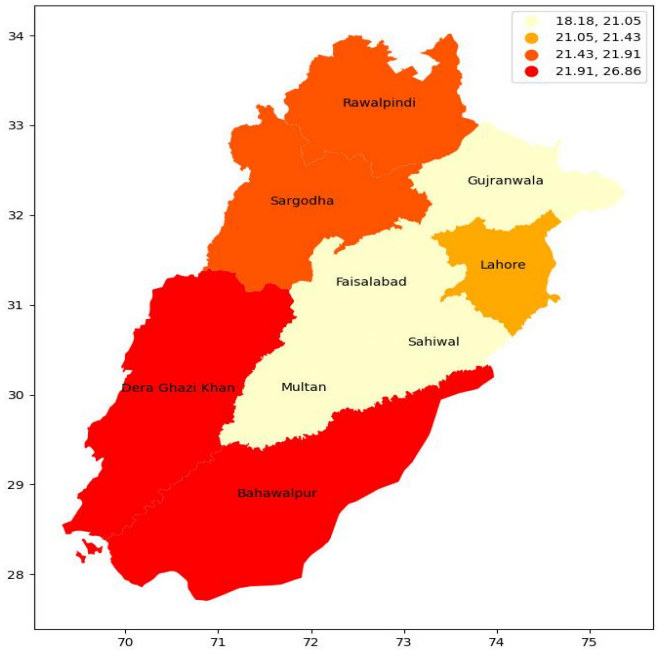

Figure 1. Map of division wise rural poverty.

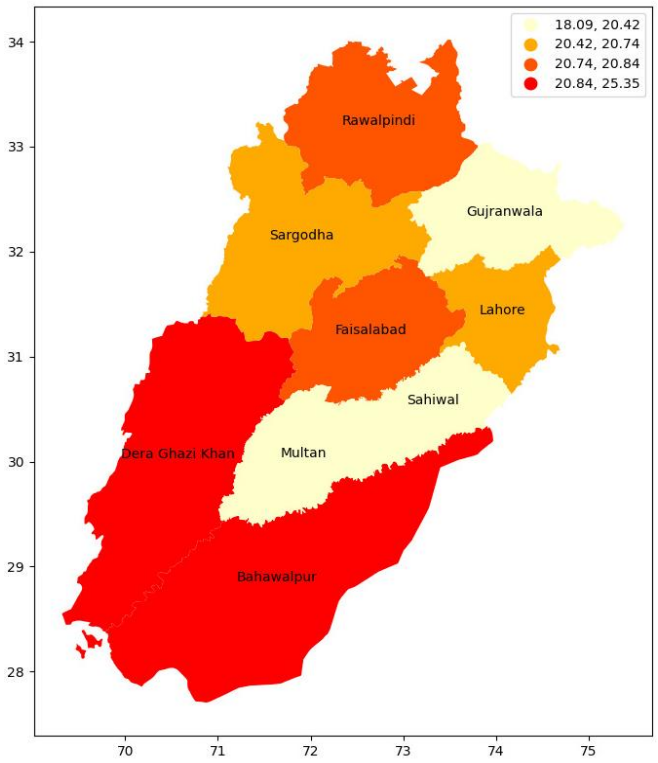

Figure 2. Map of division wise urban poverty.

Lahore division is significant city with diversified economies, however here rates of poverty are mild. This might be brought on by high cost of living, housing shortages, and sizable low-income populations. The poverty in Sargodha division is attributed to lack of opportunities. Out of all the divisions shown, Gujranwala Sahiwal and Multan (indicated in yellow) have the lowest rates of urban poverty. Being an industrial hub, Gujranwala probably benefits from a more equitable distribution of income and a thriving economy, both of which contribute to a lower rate of urban poverty.

District wise rural poverty in Punjab: District-wise rural poverty is shown in Fig.3.

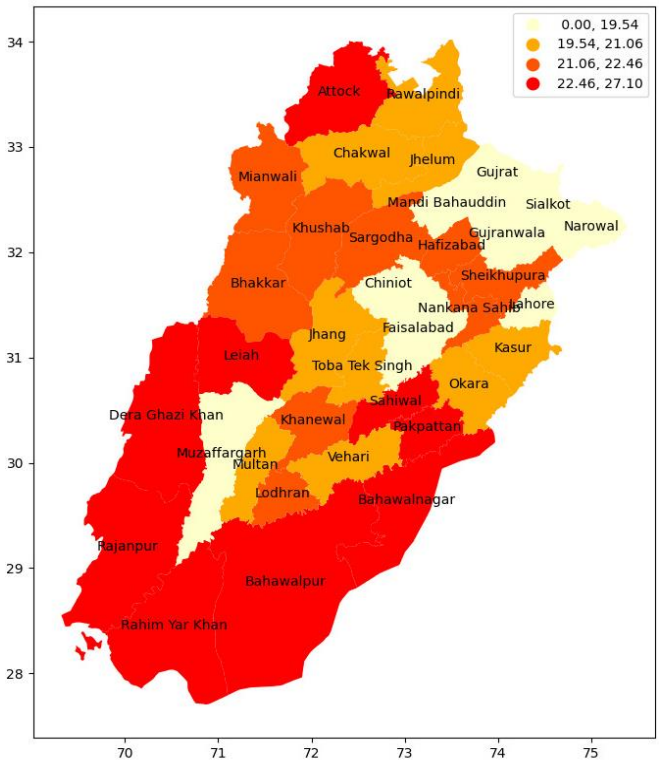

Figure 3. Map of district wise rural Poverty

***Explanation*:** The map depicts rural disparities in detail. Extreme rural poverty is indicated by the red markings of districts such as Rajanpur, Rahim Yar Khan, Bahawalpur, Bahawalnagar, Muzaffargarh, and Dera Ghazi Khan. The orange markings in the districts of Mianwali, Bhakkar, Khushab, Sargodha, and Sheikhpura signify moderate levels of rural poverty. The districts that have the lowest rates of rural poverty include those in Gujranwala, Sialkot, Narowal, Gujrat Mandi Bahauddin, and Faisalabad and these are indicated by light yellow. Punjab's rural poverty varies greatly between its districts, primarily due to factors including geographic location, resource accessibility, and economic growth. Due to its high rates of poverty, Southern Punjab needs focused interventions that include modernizing

agriculture, developing infrastructure, and creating a variety of job opportunities. Despite being in a better financial situation, Northern Punjab can act as an example for other areas because of its combination of industry and productive agriculture, which lowers poverty rates. Comprehensive policies that take into account the particular difficulties that each district faces are necessary to address these inequities.

***District wise urban poverty in Punjab*:** District-wise urban poverty is shown in figure 4.

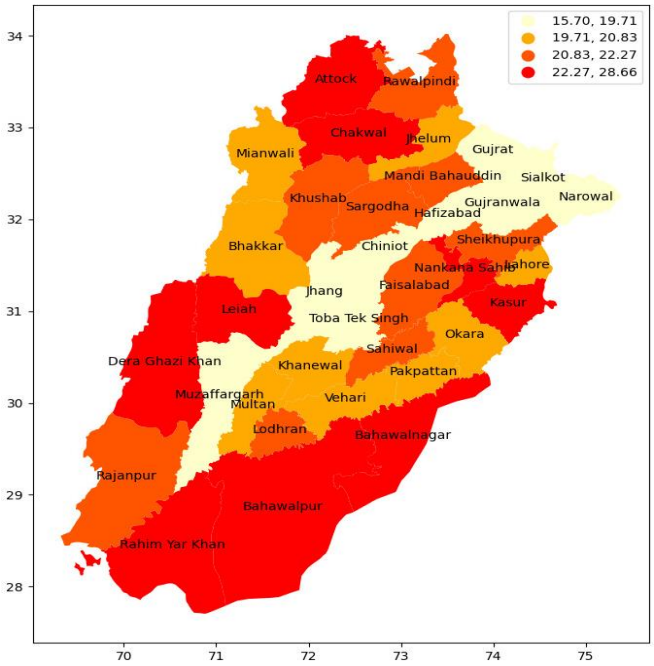

Figure 4. Map of district wise urban Poverty

***Explanation*:** The red colour for Rahim Yar Khan, Bahawalpur, Bahawalnagar, Dera Ghazi Khan, Attock, and Chakwal denote extremely poor urban areas. The urban centers in these districts lack industrialization and the service sector, which results in a dearth of employment options and low incomes. There is frequently overcrowding and inadequate infrastructure and services to support the expanding population as a result of the rapid migration of people from rural areas to major cities. The cities of Sahiwal, Khushab Sargodha, and Faisalabad are highlighted orange, signifying moderate degrees of urban poverty. Despite the increased industrialization of these areas especially in Faisalabad, poverty nevertheless exists as a result of economic disparity and the concentration of wealth in a small number of people. Numerous people hold low-paying positions without receiving social security benefits. The informal sector employs a large fraction of the metropolitan population and offers poor wages and little job security. These districts have a sharp difference between rich metropolitan regions and impoverished peripheral areas where urban poverty is concentrated, even though they are more developed than southern Punjab. The areas with the lowest rates of urban poverty are indicated in light yellow, including Gujrat, Sialkot, Gujranwala, and Narowal. These areas have strong industrial base with commercial and trade activities, furthermore, major producers of exported items from Pakistan. There is advantage of road connectivity with other parts of province and country as well. High literacy rate, better health and sanitation facilities are further sources of least poverty.

DISCUSSION

The present study was an attempt to explore the disparities in different regions of Punjab, Pakistan. The province was disaggregated in southern, central and northern Punjab. southern part of the province consisted of Bahawalpur and Dera Ghazi Khan divisions had the highest rate of poverty among all other parts. Poverty was concentrated in southern part of Punjab (Arshad, 2005). Baluchistan was the most vulnerable region, followed by low intensity Punjab, primarily made up of South Punjab and cotton/wheat Sindh based on high sensitivity and low adaptive ability (Malik et al., 2012). However, the northern part of the province is the most developed with better facilities of education, health and living standards. Gujranwala division was found the least poor. There was a mixed situation in central Punjab, where most areas represented less prevalence of poverty along with improved facilities. There existed some lagging behind pockets such as in Faisalabad where overcrowding in city surrounding areas with inadequate facilities was observed. There existed a visible division between urban and rural areas with respect to poverty. Urban areas are generally less poor as compared with their rural counterparts.60 million people in Pakistan were estimated to be impoverished, of whom 46 and 14 million lived in rural and urban regions (Anwar & Siddiqui, 2005). compared to metropolitan regions, multidimensional poverty is still more prevalent in rural communities (Rehmat & Idrees, 2022). The main factors influencing rural poverty were livestock ownership, household size, sex distribution, and dependence ratio (Ermiyas et al., 2019). The rural poverty can be reduced by raising farm household incomes. The poverty can be addressed by focusing on increasing assets and other facilities in less privileged areas. Since the analysis was based on cross section data obtained from MICS, Punjab. It presented a single point in time and did not capture changes over time. So future studies may coupe it with panel data if available or use different survey sets of MICS for dynamic track of poverty prevalence (Ali & Abdulai, 2010).

***Conclusion*:** A comprehensive analysis of poverty across Punjab is presented in this study by applying the modified Multidimensional Poverty Index (MPI) on the division,

district, rural and urban levels. This index identifies that education, health, living standards and happiness are the key factors influencing poverty in the province. Moreover, a detailed division-wise and district-wise analysis reveals important regional disparities and identifies poverty hotspots in urban slums and rural areas, mostly in the Bahawalpur, Dera Ghazi Khan and Rawalpindi divisions. The key factors behind it are low education, lack of improved healthcare services, lack of sanitation facilities and below-average household assets. Restricted health care services, overcrowding and urban slums in Faisalabad are contributing to poverty. These results suggest that a general policy intervention is not helpful in the poverty elimination agenda. A target-oriented policy is the necessity of the day for the long-term elimination of poverty and sustainable development in the province. As a result, there would be better utilization of resources with minimum leakages.

***Policy Recommendations*:** To improve knowledge of the poverty situation at a small geographical level, it is necessary to collect enhanced data of less developed and remote areas regularly through household surveys and other modern data collection tools, such as mobile data and obtain official records from government institutions, such as NADRA, etc. Since poverty is multidimensional, collective efforts from government and non-government organizations, academic institutions and local authorities with necessary resources are needed to eliminate poverty. Policy makers should use these findings to initiate plans for targeted areas, keeping in view the root causes of poverty for specific areas. As far as Faisalabad is concerned, the policy is required to provide improved clean drinking water facilities, along with costly living and a lack of job opportunities. A long-term and consistent policy is necessary for continuous monitoring through updated maps, ensuring the successful implementation of poverty reduction programs and sustainable development in Punjab, Pakistan.

***CRediT author statement*:** M. Ilyas developed the conceptual framework. M. K. Bashir helped in analysis. A. Ali and H. Zulfiqar reviewed and finalized the article.

Conflict of interest? The authors declare no conflict of interest.

Funding: The research is self-supported.

Ethical statement: The article does not contain any studies that require ethical committee approval.

Availability of data and material: The data is available with the corresponding author which can be made available on request.

***Acknowledgment*:** We are thankful to the Institute of Agricultural and Resource Economics, UAF, Punjab, Pakistan for the encouragement and support.

Informed consent: All participants signed informed consent regarding publishing the article.

***Consent to participate*:** All participants consented for this research.

***Consent for publication*:** All researchers signed consent for publication.

SDGs addressed: No poverty and wellbeing.

Policy referred: Use of Modified MPI for Poverty Assessment; Disaggregated Poverty Mapping for Policy Targeting; argeted Poverty Reduction Interventions; Integration with National and Global Poverty Reduction Frameworks, Aligns with Pakistan's 12th Five-Year Plan (2018–2023) goals: Reduce CBN poverty from 24.3% (2016) to 19%. Reduce MPI from 38.8% (2015) to 30%.

Publisher's note: All claims stated in this article are exclusively those of the authors and do not necessarily represent those of their affiliated organizations or those of the publisher, the editors, and the reviewers. Any product that may be evaluated/assessed in this article or claimed by its manufacturer is not guaranteed or endorsed by the publisher/editors.

REFERENCES

Akinyemi, F., (2010). A conceptual poverty mapping data model. *Transactions in Geographical Information System 14*, 85-100.

Ali, A., (2010). The adoption of genetically modified cotton and poverty reduction in Pakistan. *Journal of Agricultural Economics 61*, 175-192.

Alkire, S., (2011). Counting and multidimensional poverty measurement. Journal of Public Economics 95:476-487.

Alkire, S., and Jahan, S. 2018.The New Global MPI 2018: Aligning with the Sustainable Development Goals. OPHI MPI Methodological Note 47. Oxford Poverty and Human Development Initiative (OPHI), University of Oxford.

Alkire, S., (2022). A methodological note on the global multidimensional poverty index 2022 changes over time results for 84 countries. The Oxford Poverty and Human Development Initiative (OPHI), Oxford Department of International Development, University of Oxford. MPI methodological note 54.

Anwar, T., (2005). Prevalence of Relative Poverty in Pakistan. *The Pakistan Development Review 44*, 1111-1131.

Arambepola, R., (2022). A simulation study of disaggregation regression for spatial disease mapping. *Statistics in Medicine 41*, 1-16.

Arshad, N., (2005). GIS of poverty mapping analysis for Pakistan (MPRA Paper No. 38811). Munich Personal RePEc Archive.

Baffoe, G., (2019). Exploring the utility of Analytic Hierarchy Process (AHP) in ranking livelihood activities for effective and sustainable rural development interventions in developing countries. *Evaluation and Program Planning 7*, 197-204.

Bigman, D., (2002). Geographical targeting of poverty alleviation programs: methodology and applications in rural India. *Journal of Policy Modeling 24*, 237-255.

Bureau of Statistics, (2018). Multiple indicator cluster survey, Punjab 2017-18, Planning and Development Board, Government of Punjab, Lahore.

Cartone, A., (2022). Regional economic disparities, spatial dependence and proximity structures. *Regional Science Policy & Practice 14*, 1034-1051.

Eriksen, S., (2021). Adaptation interventions and their effect on vulnerability in developing countries: Help, hindrance or irrelevance? *World development 141*, 105383.

Ermiyas, A., (2019). Determinants of rural poverty in Ethiopia: a household level analysis in the case of Dejen woreda. *Arts and Social Sciences Journal 50*, 1-6

Gao, Q., (2015). Welfare, targeting, and anti-poverty effectiveness: The case of urban China. The Quarterly *Review of Economics and Finance 56*, 30-42.

Graham, C. 2005. The economics of happiness: Insights on globalization from a novel approach. World Economics, 6:41-55.

Graham, C., (2011). Happiness around the world: The paradox of happy peasants and miserable millionaires. Brookings scholar lecture series, Brookings Mountain West, University of Nevada, Las Vegas.

Haq, W., (2024). Investigation of multidimensional poverty in Pakistan at the national, regional, and provincial level. *Humanities and Social Sciences Communications 11*, 1-9.

Hossain, M.J., (2020). Disaggregate level estimates and spatial mapping of food insecurity in Bangladesh by linking survey and census data. *Journal of Public Library Science 15*, 0230906.

Kangas, O., (2019). Different methods–different results: Approaches to multidimensional poverty. In: H-J. Andreß and H. Lohmann (eds.), Empirical poverty research in a comparative perspective. pp. 167-204. Springer, Berlin, Germany.

Kiran, R., (2022). Policy-oriented food insecurity estimation and mapping at district level in Pakistan. Agricultural and Resource Economics: International Scientific E-Journal, 8, 33-65.

Maharjan, A., (2020). Migration and household adaptation in climate-sensitive hotspots in South Asia. *Current Climate Change Reports 6*, 1-16.

Malik, S. M., (2012). Mapping vulnerability to climate change and its repercussions on human health in Pakistan. *Globalization and Health 1*, 8-31.

Mateu, P., (2020). Happiness and poverty in the very poor Peru: Measurement improvements and a consistent relationship. *Quality and Quantity, 54*, 1075-1094

Nadeem, F., (2022). Mapping agricultural vulnerability to impacts of climate events of Punjab, Pakistan. *Regional Environmental Change 22*, 66.

Ministry of Finance, (20190. Economic Survey of Pakistan 2018-19. Economic Advisor's Wing, Finance Division, Government of Pakistan, Islamabad, Pakistan.

Planning Commission of Pakistan & UNDP, (2016). Multidimensional Poverty in Pakistan. Islamabad: Ministry of Planning, Development and Reform, Government of Pakistan.

Rehmat, S., (2022). Multidimensional Poverty Disparity in Pakistan. Pakistan. *Journal of Social Research 4*, 567-582.

Qiu, Y., (2019). Geospatial disaggregation of population data in supporting SDG assessments: a case study from Daqing County, China. *ISPRS International Journal of Geo-Information 8*, 356.

Qiu, Y., (2022). Disaggregating population data for assessing progress of SDGs: methods and applications. *International Journal of Digital Earth 15*, 2-29.

Shirazi, N., (2014). Why poverty reduction programs of Pakistan did not bring significant change? *An Appraisal*, 1435-17.

Shergill, B.S., (2023). Challenges to Punjab Economy: A Regional Perspective from India. Taylor & Francis, Abingdon, UK.

Singh, P.K., (2020). Evaluating poverty alleviation strategies in a developing country. Journal of PloS One 15:0227176.

United Nations Development Programme (UNDP) & Oxford Poverty and Human Development Initiative (OPHI). 2023. Global Multidimensional Poverty Index 2023: Unstacking global poverty – Data for high-impact action.

Vilar-Compte, M., (2021). Urban poverty and nutrition challenges associated with accessibility to a healthy diet: a global systematic literature review. *International Journal for Equity in Health 20*, 1-19.

World Bank, (2023). Poverty and Inequality Platform: Pakistan. The World Bank Group.